U.S. Army Center for Health Promotion and Preventive Medicine

Just the Facts

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Ultraviolet (UV) Radiation Protection, and the Science of UV Exposure from the Sun and Sky

- UV Exposure
- UV Health Effects
- UV Protection

Small Shadow = Hazardous UV

Long Shadow = Safe

Introduction

Today, many people love to play outdoor sports, and see these sports as an important part of a healthy lifestyle. Many civilians and military personnel work and exercise in the sun, often without protection against the hazards to the skin and eyes from overexposure to ultraviolet (UV) radiation. This fact sheet lists the sources of outdoor UV exposure, and why protective measures can be important outside the summer months.

The UV Hazard During Midday Exercise, and the "Shadow Rule" for UV Protection

The amount of UV radiation exposure increases dramatically as the sun gets higher in the sky. The exposures are most intense when the sun is more than halfway to being directly overhead. During the summer months, you should take protective measures between the hours of 10:00 a.m. and 4:00 p.m. Another way to protect yourself is the "shadow rule": the UV hazard is worst when the shadow you cast on the ground is shorter than you are tall.

Other Sources of Outdoor UV Exposure

Direct sun exposure isn't the only source of UV radiation in the outdoors. You can get a sunburn even when you're in the shade -- it just takes longer. The reason is that UV radiation is scattered from the surrounding blue sky as well. As the sun reaches its highest point in the sky, the rest of the sky can contribute as much as half the UV exposure that one receives.

UV radiation can also be reflected to you from the ground. Green grass doesn't reflect much, but sand, sea foam and especially fresh snow reflect more. Fresh snow can actually double the UV hazard that you receive outdoors. As any experienced skier will tell you, it ***is*** possible to get a sunburn in the winter -- that's why!

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Short- and Long-Term Effects of UV Overexposure to the Skin

Short-term effects on the skin vary from a light reddening of the skin (known as "erythema," more commonly known as "sunburn") to blistering. Long-term effects include increased wrinkling of the skin, and both nonmelanoma and malignant melanoma skin cancers.

The term "sunburn" is misleading. The effect is not caused by heating, and UV overexposures can occur outside the summer months. The amount of exposure depends on the sun's height in the sky, not the outdoor temperature. Some people are more sensitive to UV exposures than others, and should protect themselves accordingly. These skin types range from fair-skin which always burns and never tans, to deeply pigmented brown or black skin which almost never burns. Protective measures should be practiced in each case.

Short- and Long-Term Effects of UV Overexposure to the Eyes

Short-term effects of very high exposure to the eye include damage to the outer layers of the cornea. This damage is known as photokeratitis, also known as "snowblindness." Snowblindness is a painful but temporary effect. Long-term effects include cataracts, and the development of pterygium -- a blemish that may reduce vision if advanced enough. The U.S. government spent $3.4 billion last year on cataract operations, 20% of which could have been prevented or delayed.

How to Protect Against UV Overexposure to the Skin and Eyes

Reduce outdoor activities during the midday hours, especially in summertime. When outside, clothing is the first line of defense. Protect the skin by wearing long-sleeved shirts and clothing that covers the legs. To protect the head and neck, wear wide-brimmed hats. If you've ever visited the tropics, you'll notice that the locals protect themselves by wearing clothes that cover their arms and legs. The tourists, on the other hand, are more likely to wear shorts and tank tops.

If the skin isn't protected by clothing, use 15+ sunscreen for the exposed skin. Apply the sunscreen liberally -- otherwise, the sunscreen will be less effective! The Sun Protection Factor (SPF) listed on bottles of sunscreen works as follows: SPF 2 reduces the UV exposure to one-half (½), SPF 4 reduces the UV exposure to 1/4, SPF 10 reduces the exposure to 1/10, and so on. Protect the eyes by wearing wide-brimmed hats and sunglasses, especially wraparound sunglasses. Skiers and others in snow environments should wear sunscreens and sunglasses, due to the increased exposure from ground reflections.

Some Prescription Drugs Increase Sensitivity to UV Radiation

Increased UV radiation damage can occur with some medications, including some oral antibiotics and non-steroid anti-inflammatory drugs. Consult your doctor or pharmacist if there is any concern.

References

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3. Sunlight, Ultraviolet Radiation, and the Skin, National Institutes of Health Consensus Development Conference Statement, Online 1989 May 8-10; 7(8):1-29.